INFORMATION PAPER

Military Vaccine Agency 24 Feb 2006

SUBJECT: Diphtheria and Diphtheria Toxoid

1. Purpose: To describe diphtheria and the toxoid vaccine to prevent it.

2. Facts.

a. Microbiology. Diphtheria is an acute disease caused by toxins produced by *Corynebacterium diphtheriae* bacteria. The name of the disease comes from a Greek word meaning “leather hide.” Toxin production (toxigenicity) occurs only when the bacteria themselves are infected (lysogenized) by a specific virus (bacteriophage) that carries the genetic information for the toxin. Only toxigenic strains can cause severe disease.

b. Epidemiology. Diphtheria is a contagious disease caused by bacteria that usually attack the tonsils, pharynx, larynx, nose, skin, and occasionally other mucous membranes. A patch or patches of a sticky, gray membrane with surrounding swelling mark the characteristic lesion. Transmission is most often caused by person-to-person spread from the respiratory tract, and may occur as long as virulent bacilli are present in discharges and lesions. Diphtheria is common in many parts of the world, but clinical cases are more prevalent in temperate zones during winter and spring. Diphtheria remains endemic in developing countries.

c. Vaccine. Because diphtheria was one of the most common causes of childhood death, diphtheria toxoid has the distinction of contributing more to increased life expectancy than any other vaccine or medication. Single-antigen diphtheria toxoid is not available. Diphtheria toxoid is available combined with tetanus as pediatric DT or adult Td, and with both tetanus toxoid and acellular pertussis vaccine as DTaP. Pediatric formulations (DT and DTaP) contain a similar amount of tetanus toxoid as adult Td, but contain 3 to 4 times as much diphtheria toxoid. Children younger than 7 years of age should receive either DTaP or pediatric DT. People 7 years of age or older should receive the adult formulation (either Td or Tdap), even if they have not completed a series of DTaP or pediatric DT. Tdap is available as Adacel™ (manufactured by Aventis Pasteur) which is licensed for use in people 19 to 64 years old. Boostrix® (manufactured by GlaxoSmithKline), another Tdap product, is licensed for use in people 10 to 18 years old only. DTaP vaccines do not contain thimerosal as a preservative.

d. Immunization.

1. Children: The primary DTaP vaccinating series (which protects against tetanus, diphtheria, and pertussis) consists of four doses, the first three doses given at 4- to 8-week intervals, beginning at 6 weeks to 2 months of age. The standard schedule is 2, 4, and 6 months of age, followed by a fourth dose given 6 to 12 months

after the third dose, to maintain adequate immunity for the ensuing preschool years. Inject DTaP simultaneously with other indicated vaccines.

2. Adolescents: Administer a single dose of Tdap to 11 to 18 years old should receive one dose of Tdap instead of Td for booster immunization if they have completed the recommended childhood DTP/DTaP immunization series and have not received Td or Tdap. The preferred age for Tdap immunization is at 11 to 12 years of age to reduce the morbidity associated with pertussis in adolescents. For adolescents ages 11 to 18 years old who received Td, but not Tdap, are encouraged to receive a single dose of Tdap if they completed their childhood DTP/DTaP immunizations. An interval of 5 years between Td and Tdap is recommended to reduce the risk for local and systemic reactions after Tdap.

3. Adults: Administer a single dose of Tdap to replace a single dose of Td for booster immunization in adults who received their most recent tetanus-toxoid containing vaccine ≥ 10 years earlier. Tdap may be given at an interval as short as 2 years following most recent tetanus-toxoid containing immunization to protect against pertussis.

e. Cautions. The following people should not receive diphtheria-containing vaccine: people with a history of a severe allergic reaction to a previous dose or any vaccine component. Diphtheria toxoid should be deferred for people who have moderate to severe acute illness. Immune suppression and pregnancy are not restrictions to diphtheria toxoid. If a child has a valid bar to pertussis vaccine, complete the vaccination series with pediatric DT.

f. Adverse Events. The most common adverse reactions after vaccination with diphtheria-containing vaccines are redness and induration (with or without tenderness) at the injection site. Mild systemic reactions such as fever, drowsiness, fretfulness, and low-grade fever can occur after vaccination with DTaP. Severe systemic events (febrile seizures, persistent crying lasting 3 or more hours, and hypotonic-hyporesponsive episodes) are uncommon. Arthus-type hypersensitivity reactions, generally starting 2 to 8 hours after an injection and involving severe localized symptoms, may occur, particularly in people who have received multiple prior booster doses.

g. DoD Policy. Administer Td vaccine to recruits and other accessions, and to all other adults. For those for whom an adequate primary immunizing series is doubtful, give additional Td doses according to Advisory Committee on Immunization Practices (ACIP) guidelines. Administer booster doses of Td every 10 years.

h. Special Considerations. Diphtheria infection may not confer immunity. People recovering from diphtheria should begin or complete active immunization with diphtheria toxoid during convalescence.

3. References:

a. Advisory Committee on Immunization Practices. Diphtheria, tetanus, and pertussis: Recommendations for vaccine use and other preventive measures. MMWR 1991;40(RR10):1-28. Available from: www.cdc.gov/mmwr/preview/mmwrhtml/00041645.htm

b. CDC disease information. www.cdc.gov/ncidod/dbmd/diseaseinfo/diphtheria_t.htm

c. Multiple resources (e.g., product insert, Vaccine Information Statements) assembled by Military Vaccine Agency: www.vaccines.mil/diphtheria

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